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NEMA ICS 6-1993 (R2001, R2006, R2011, R2016)

Standard for Industrial Control and Systems: Enclosures

National Electrical Manufacturers Association

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Industrial Control and Systems: Enclosures

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Foreword

This standards publication was prepared by a technical committee of the NEMA Industrial Automation Control Products and Systems Section. It was approved in accordance with the bylaws of NEMA and supersedes the indicated NEMA Standards Publication. This standards publication supersedes ICS 6-1993 (R2001).

This standards publication provides practical information concerning ratings, construction, test, performance and manufacture of industrial control equipment. These standards are used by the electrical industry to provide guidelines for the manufacture and proper application of reliable products and equipment and to promote the benefits of repetitive manufacturing and widespread product availability.

NEMA standards represent the result of many years of research, investigation, and experience by the members of NEMA, its predecessors, its sections and committees. They have been developed through continuing consultation among manufacturers, users and national engineering societies and have resulted in improved serviceability of electrical products with economies to manufacturers and users.

One of the primary purposes of this standards publication is to encourage the production of reliable control equipment which, in itself, functions in accordance with these accepted standards. Some portions of these standards, such as electrical spacings and interrupting ratings, have a direct bearing on safety; almost all of the items in this publication, when applied properly, contribute to safety in one way or another.

Properly constructed industrial control equipment is, however, only one factor in minimizing the hazards, which may be associated with the use of electricity. The reduction of hazard involves the joint efforts of the various equipment manufacturers, the system designer, the installer and the user. Information is provided herein to assist users and others in the proper selection of control equipment.

The industrial control manufacturer has limited or no control over the following factors, which are vital to a safe installation:

a. Environmental conditions
b. System design
c. Equipment selection and application
d. Installation
e. Operating practices
f. Maintenance

This publication is not intended to instruct the user of control equipment with regard to these factors except insofar as suitable equipment to meet needs can be recognized in this publication and some application guidance is given.

This standards publication is necessarily confined to defining the construction requirements for industrial control equipment and to providing recommendations for proper selection for use under normal or certain specific conditions. Since any piece of industrial control equipment can be installed, operated and maintained in such a manner that hazardous conditions may result, conformance with this publication does not by itself assure a safe installation. When, however, equipment conforming with these standards is properly selected and is installed in accordance with the National Electrical Code and properly maintained, the hazards to persons and property will be reduced.

To continue to serve the best interests of users of Industrial Control and Systems equipment, the Industrial Automation Control Products and Systems Section is actively cooperating with other standardization organizations in the development of simple and more universal metrology practices. In this publication, the U.S. customary units are gradually being supplemented by those of the modernized metric system known as the International Systems of Units (SI). This transition involves no changes in standard dimensions, tolerances, or performance specifications.

NEMA standards publications are subject to periodic review. They are revised frequently to reflect user input and to meet changing conditions and technical progress.

Proposed revisions to this standards publication should be submitted to:

Senior Technical Director, Operations
National Electrical Manufacturers Association
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This standards publication was developed by the Industrial Automation Control Products and Systems Section. Section approval of the standard does not necessarily imply that all section members voted for its approval or participated in its development. At the time it was approved, the Industrial Automation Control Products and Systems Section consisted of the following members:

ABB Control, Inc., Wichita Falls, TX
Alstom Drives and Controls, Inc., Pittsburgh, PA
Automatic Switch Company, Florham Park, NJ
Balluff, Inc., Florence, KY
Carlo Gavazzi, Inc., Buffalo Grove, IL
CMC Torque Systems, Billerica, MA
Control Concepts Corporation , Beaver, PA
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MagneTek Inc., New Berlin, WI
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Omron Electronics, LLC, Schaumburg, IL
Peerless-Winsmith, Inc., Warren, OH
Pepperl + Fuchs, Inc., Twinsburg, OH
Phoenix Contact, Inc., Harrisburg, PA
Pittman, a Div. of Penn Engineering & Manufacturing Corporation, Harleysville, PA
Post Glover Resistors, Inc., Erlanger, KY

RENCO Encoders, Goleta, CA
Regal-Beloit Corporation, Bradenton, FL
Reliance Controls Corporation, Racine, WI
Robert Bosch Corporation, Avon, CT
Rockwell Automation, Milwaukee, WI
R Stahl, Inc., Salem, NH
Russelectric, Inc., Hingham, MA
Schneider Automation, Inc., North Andover, MA
SEW-Eurodrive, Inc., Lyman, SC
Siemens Energy & Automation, Alpharetta, GA
Square D, Lexington, KY
Texas Instruments, Inc., Attleboro, MA
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Toshiba International Corporation, Houston, TX
Total Control Products Inc., Milford, OH
Turck, Inc., Plymouth, MN
Tyco Electronics/AMP, Harrisburg, PA
WAGO Corp., Germantown, WI
Weidmuller, Inc., Richmond, VA
Yaskawa Electric America, Waukegan, IL

1 General

1.1 Referenced Standards

The following standards contain provisions which, through reference in this text, constitute provision of this NEMA Standard Publication. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

American Society of Mechanical Engineers
345 East 47th Street
New York, NY 10017

ASME B1.20.1-1983 (R1992) *Pipe Threads (General Purpose)*

Canadian Standards Association
178 Rexdale Blvd.
Rexdale, Ontario M9W 1R3 Canada

CSA C22.2-0-M91 (R1997) *General Requirements - Canadian Electrical Code, Part II*

CSA C22.2-0.5-1982 (R1999) *Threaded Conduit Entries*

National Electrical Manufacturers Association
1300 North 17th Street, Suite 1847
Rosslyn, VA 22209

FB 1-1993 *Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies*

ICS 1-2000 *Industrial Control and Systems General Requirements*

ICS 1.3-1986 (R2001) *Preventive Maintenance of Industrial Control and Systems Equipment*

NEMA 250-1997 *Enclosures for Electrical Equipment (1000 Volts Maximum)*

National Fire Protection Association
Batterymarch Park
Quincy, MA 02269

ANSI/NFPA 70-1999 *National Electrical Code*

Underwriters Laboratories, Inc.
333 Pfingsten Road
Northbrook, IL 60062

UL 508-1999 *Industrial Control Equipment (17th Ed)*

UL 698-1995 *Industrial Control Equipment for Use in Hazardous Locations*

1.2 Scope

The standards in this publication apply to enclosures used for all enclosed products within the scope of the Industrial Automation Control Products and Systems Section.

1.3 Normative Standards

The definitions and standards of NEMA Standards Publications No. 250 and ICS 1 apply, except that the 1,000-volt maximum limitation does not apply to enclosures for industrial control and systems.

1.4 General Requirements

Enclosure types for products within the scope of the Industrial Automation Control Products and Systems Section shall meet all the requirements of NEMA Standards Publication No. 250 and also the requirements contained herein except that the enclosure with its enclosed equipment for hazardous locations need only meet the requirements of UL 698.

2 Definitions

See NEMA Standards Publication No. 250 for definitions applying to this standard.

3 Classification

3.1 Standard Enclosure Types

Enclosure types for products within the scope of the Industrial Controls and Systems Section shall be Types 1, 2, 3, 3R, 3S, 4, 4X, 5, 6, 6P, 7, 8, 9, 10, 12, 12K and 13 as defined by NEMA Standards Publication No. 250.

3.2 Multiple Type Designations

Enclosures shall be designated by the type number indicating the external conditions for which they are suitable. A single enclosure which meets the requirements for more than one type of enclosure shall be permitted to be designated by a series of type numbers, the lesser number being given first.

4 Characteristics and Ratings

This publication contains no ratings.

5 Product Marking, Installation, and Maintenance Information

5.1 Marking

Enclosures shall be marked with their type designation(s).

5.2 Enclosure Grounding

Conductive material which encloses electric conductors or equipment or forms part of such equipment must be grounded.